Claims

1   What is claimed is:

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3   1.   A method of calculating capacity of an intelligent battery equipped with a current

4   measurement circuit to measure an electric current value on which calculation of battery capacity

5   is based, comprising the steps of:

6   (a) sending, from a system to the intelligent battery, a notice that it shifts to a low electric

7   power consumption mode, and a consumption electric current value or a consumption

8   electric power value in the low electric power consumption mode unique to the system,

9   when the system using the intelligent battery shifts from a normal operational mode to the

10   low electric power consumption mode;

11   (b) performing subtraction of capacity data of the intelligent battery based on the received

12   consumption electric current value or consumption electric power value in the low

13   electric power consumption mode, and disabling capacity calculation by the current

14   measurement circuit;

15   (c) sending, from the system to the intelligent battery, a notice of shifting to the normal

16   operational mode, and stopping the subtraction of capacity data based on the consumption

17   electric current value or consumption electric power value in the low electric power

18   consumption mode, and enabling capacity calculation by the current measurement circuit,

19   when the system using the intelligent battery shifts from the low electric power

20   consumption mode to the normal operational mode.

1   2. The method of calculating capacity of an intelligent battery according to Claim 1, wherein

2   said low electric power consumption mode is a soft-off state or a suspended state in

3   ACPI.

1   3. The method of calculating capacity of an intelligent battery according to Claim 1, wherein

2   said intelligent battery is SBS-compliant and a notice of the mode shifting from the system to

3   the battery and the consumption electric current value or consumption electric power value in

4   the low electric power consumption mode is sent by defining in one command or a plurality

5   of commands of OptionalMfgFunction1 to OptionalMfgFunction5 of SBS.

1   4. The method of calculating capacity of an intelligent battery according to Claim 1,

2   wherein, in the low electric power consumption mode:

3   (a) on detecting that the intelligent battery is drawn out of the system, the subtraction of

4   capacity data based on the received consumption electric current value or consumption

5   electric power value in the low electric power consumption mode is stopped;

6   (b) next, on detecting that the intelligent battery is connected to the system, the battery

7   counts time from the connection; and

8   (c) when the system using the intelligent battery shifts from the low electric power

9   consumption mode to the normal operational mode:

10   (i) the system sends a notice is sent to the effect that it is reconnected to the intelligent

11   battery and also sends the consumption electric current value or consumption electric

12   power value in the low electric power consumption mode unique to the system;

13   (ii) capacity to be subtracted from reconnection is calculated from the received

14   consumption electric current value or consumption electric power value and the counted

15   time, and the calculated capacity to be subtracted is subtracted from the capacity data; and

16   (d) next, a notice is sent from the system to the intelligent battery to the effect that it shifts

17   to the normal operational mode and also the subtraction of capacity data based on the

18   consumption electric current value or consumption electric power value in the low

19   electric power consumption mode is stopped, and capacity calculation by the current

20   measurement circuit is enabled on the other hand.

1   5.   The method of calculating capacity of an intelligent battery according to Claim 1,

2   wherein, in the low electric power consumption mode:

3   (a) on detecting that the intelligent battery is drawn out of the system, that the intelligent

4   battery stops the subtraction of capacity data based on the consumption electric current

5   value or consumption electric power value received in the low electric power

6   consumption mode;

       (b) next, on detecting that the intelligent battery is connected to the system:

       (i) the system recognizing the connection sends a notice to the effect that it is reconnected

9   to the intelligent battery and also sends the consumption electric current value or

10   consumption electric power value in the low electric power consumption mode unique to

11   the system;

12   (ii) the intelligent battery resumes subtraction of capacity data based on the received

13   consumption electric current value or consumption electric power value in the low

14   electric power consumption mode, and disables capacity calculation by the current

15   measurement circuit on the other hand;

16   (c) when the system using the intelligent battery shifts from the low electric power

17   consumption mode to the normal operational mode, the system sends a notice to the

18   battery that it shifts to the normal operational mode and also stops the subtraction of

19   capacity data based on the consumption electric current value or consumption electric

20   power value in the low electric power consumption mode, and enables capacity

21   calculation by the current measurement circuit on the other hand.

1   6.   A method of calculating capacity of an intelligent battery equipped with a current

2   measurement circuit to measure an electric current value on which calculation of battery

3   capacity is based, comprising the steps of:

4   (a) on a shift of the system from a normal operational mode to a low electric power

5   consumption mode and thereafter to the normal operational mode, calculating on the

6   system side consumption battery capacity data assumed to have been spent during the low

7   electric power consumption mode based on a consumption electric current value or a

8   consumption electric power value in the low electric power consumption mode unique to

9   the system.

10   (b) sending consumption battery capacity data from the system side to said intelligent

11   battery side;

12   (c) on said intelligent battery side, calculating current battery capacity based on said

13   consumption battery capacity data.

1   7.   An intelligent battery for use with a portable electronic device having a first system

2   component for operating with supplied electric power in a normal operational mode but

3   not operating with no supplied electric power in the low electric power consumption

4   mode, and a second system component for operating with supplied electric power both in

5   the normal operational mode and in the low electric power consumption mode, and a

6   controller for supplying electric power to said first and second system components in the

7   normal operational mode and supplying electric power to said second system component

8   and stopping supply of electric power to said first system component in the low electric

9   power consumption mode, comprising:

10   (a) a timer;

11   (b) a mode shift notice receiving unit for receiving a mode shift notice indicating a shift

12   from the normal operational mode to the low electric power consumption mode or a shift

13   from the low electric power consumption mode to the normal operational mode and a

14   consumption electric current value or a consumption electric power value in the low

15   electric power consumption mode unique to the second system component;

16   (c) a unit for calculating capacity data to be subtracted based on a period of the low

17   electric power consumption mode after shifting to the mode measured by the timer and

18   the received consumption electric current value or consumption electric power value in

19   the low electric power consumption mode.

1   8.   An intelligent battery for use with a portable electronic device having a first system

2   component for operating with supplied electric power in the normal operational mode but

3   not operating with no supplied electric power in the low electric power consumption

4   mode, and a second system component for operating with supplied electric power both in

5   the normal operational mode and in the low electric power consumption mode, and a

6   controller for supplying electric power to said first and second system components in the

7   normal operational mode and supplying electric power to said second system component

8   and stopping supply of electric power to said first system component in the low electric

9   power consumption mode, comprising:

10   (a) a timer;

11   (b) a mode shift notice receiving unit for receiving a mode shift notice indicating a shift

12   from the normal operational mode to the low electric power consumption mode or a shift

13   from the low electric power consumption mode to the normal operational mode and,

14   based on a consumption electric current value or a consumption electric power value in

15   the low electric power consumption mode unique to the second system component

16   calculated on the system side, consumption battery capacity data assumed to be consumed

17   during the low electric power consumption mode;

18   (c) a unit for calculating capacity data to be subtracted based on a period of the low

19   electric power consumption mode after shifting to the mode measured by the timer and

20   the received consumption battery capacity data in the low electric power consumption

21   mode.

1   9.   A portable electronic device, comprising:

2   (a) a first system component for operating with supplied electric power in the normal

3   operational mode but not operating with no supplied electric power in the low electric

4   power consumption mode;

5   (b) a second system component for operating with supplied electric power both in the

6   normal operational mode and in the low electric power consumption mode; and

7   (c) a controller for:

8   (i) performing control to supply electric power to said first and second system

9   components, and supply electric power to said second system component and stop supply

10   of electric power to said first system component in the low electric power consumption

11   mode;

12   (ii) when shifting from the normal operational mode to the low electric power

13   consumption mode, sending to an intelligent battery a notice of shifting to the low electric

14   power consumption mode and also sending a consumption electric current value or a

15   consumption electric power value unique to the system and

16   (iii) when shifting from the low electric power consumption mode to the normal

17   operational mode, sending from the system to the intelligent battery a notice of shifting to

18   the normal operational mode; and

19   said intelligent battery characterized by:

20   (iv) in the low electric power consumption mode, performing subtraction of capacity data

21   based on the received consumption electric current value or consumption electric power

22   value in the mode, and disabling capacity calculation on the current measurement circuit

23   on the other hand;

24   (v) when shifting from the low electric power consumption mode to the normal

25   operational mode, stopping the subtraction of capacity data based on the consumption

26   electric current value or consumption electric power value in the low electric power

27   consumption mode, and enabling capacity calculation by the current measurement circuit

28   on the other hand.

1   10.   A portable electronic device, comprising:

2   (a) a first system component for operating with supplied electric power in a normal

3   operational mode but not operating with no supplied electric power in a low electric

4   power consumption mode;

5   (b) a second system component for operating with supplied electric power both in the

6   normal operational mode and in the low electric power consumption mode; and

7   (c) a controller for:

8   (i) performing control to supply electric power to said first and second system

9   components, and supply electric power to said second system component and stop supply

10   of electric power to said first system component in the low electric power consumption

11   mode;

12   (ii) when shifting from the normal operational mode to the low electric power

13   consumption mode, sending from a system to an intelligent battery a notice of shifting to

14   the low electric power consumption mode and also sending consumption battery capacity

15   data assumed to be consumed during the low electric power consumption mode based on

16   a consumption electric current value or a consumption electric power value in the low

17   electric power consumption mode unique to the second system component calculated on

18   the system side; and

19   (iii) when shifting from the low electric power consumption mode to the normal

20   operational mode, sending from the system to the intelligent battery a notice of shifting to

21   the normal operational mode; and

22   said intelligent battery characterized by:

23   (iv) performing subtraction of the capacity data based on the received consumption

24   battery capacity data in the low electric power consumption mode, and disabling capacity

25   calculation on the current measurement circuit on the other hand;

26   (v) when shifting from the low electric power consumption mode to the normal

27   operational mode, stopping the subtraction of capacity data based on the consumption

28   current capacity data in the low electric power consumption mode, and enabling capacity

29   calculation by the current measurement circuit on the other hand.